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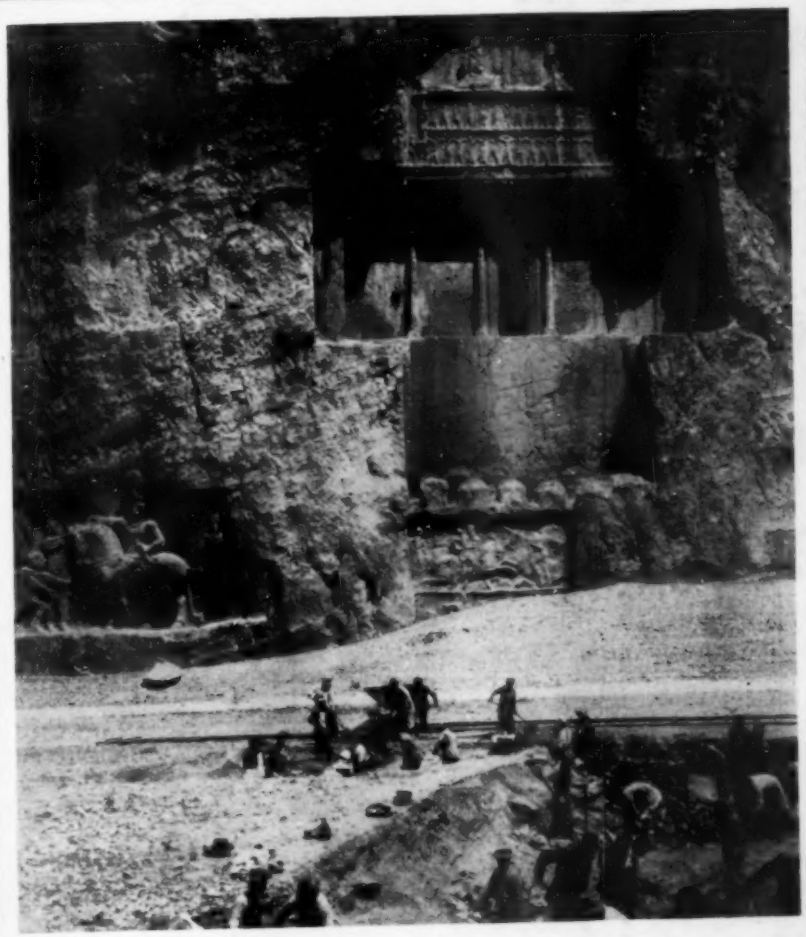
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



AUGUST 15, 1936

Royal Resting Place

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A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

Vol. XXX *No. 801*

The Weekly Summary of

Current Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

Gem experts recognize five different shades of green in emeralds.

Grasshoppers this year have wiped out 50,000 acres of cotton and 50,000 acres of corn in Oklahoma alone.

Scientists have found that they can use rabbits as substitutes for cattle in trying out the palatability of grasses.

Coffee planters in Java and Salvador often notice that their coffee crop is greater the year after a volcanic eruption.

The dangerous Anopheles mosquito, which carries malaria, does not sing so loudly as other mosquitoes and gives a less painful bite.

London fire fighters are trying out a life-line pistol which can be used to shoot a rope to a desired point, so that the hose can be hauled up more quickly.

The American Museum of Natural History prizes a fish an inch and a half long, found by the Byrd Antarctic Expedition 16 miles southwest of Little America.

Mineral wealth of the "barren" Arctic includes gold, platinum, coal, oil, asbestos, copper, and nickel.

To produce hydrogen needed for the trans-Atlantic zeppelin service, an electrolyzing plant is being built in Rio de Janeiro.

A Japanese canning company has been working three years to produce sauerkraut closely resembling the German kraut.

What is believed to be an ancient Greek colony known as Hienos has been unearthed during construction in the Caucasus region.

In seeking odors that will lure codling moths to traps, scientists find that nicotine is a better lure for male moths than for the females.

By keeping a spray solution in a galvanized bucket, scientists accidentally discovered that the zinc impurities dissolved from the bucket would control pecan rosette which injures pecan trees, so now zinc sulphate is used for this disease.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

ARCHAEOLOGY

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ASTRONOMY

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PLANT PHYSIOLOGY

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PSYCHIATRY

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PSYCHOLOGY

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PUBLIC HEALTH

Does prenatal care improve the chances of life for the infant? p. 102.

Is the value of the spray for preventing infantile paralysis now known? p. 104.

SEISMOLOGY

How did the first Lick Observatory seismograph operate? p. 103.

VITAL STATISTICS

Is the suicide rate high? p. 105.

CLIMATOLOGY

U.S.S.R. Takes Its Arctic Winters Into the Laboratory

Laboratory of Artificial Climate in Moscow Tests Effects of Ice and Snow on Railroads, Crop Growth, and Clothing

By PROF. S. L. BASTYAMOV,
Moscow Laboratory of Climate

THE HEAT of the Turkmenian sun blazes a few feet from biting Siberian frost. A balmy Caucasian morning dawns separated by a thin partition from a crisp Arctic day.

All seasons of the year, summer and winter temperatures, calm weather and winds, humidity and drought, are reproduced in the same place, in the same building—the Moscow Laboratory of Climate.

Air is cooled in huge refrigerators, heated in electric furnaces, has its humidity controlled, and is given different velocities in imitation of wind. The reproduction of natural conditions is very accurate, coming within 0.2 to 0.3 degrees of variation in temperature and 3 to 4 per cent in the relative humidity of the air. In short, this Moscow laboratory practices air-conditioning on a grand scale.

The conveniences thus provided for scientific experimenters greatly accelerate the tempo of scientific research.

Study Snowdrifts

One problem studied is that of snow retention and protection of railroads against snowdrifts. This is done with a wind tunnel in which wind velocities are produced identical to those actually observed in nature. The tube is long enough to provide study of the effect of fences and barriers on wind-blown snow over a considerable distance. Snow is blown at model fences. By comparing results it is possible to determine the coefficients of efficiency of various designs of snow fences.

This research has led to the discovery of a new method of protection called "the active struggle against snow." It was found that if several raised barriers are placed on both sides of the railway road-bed, leaving a comparatively narrow opening between the top of the railway cut and the bottom of the barriers, and a current of wind and snow be blown through the opening, the wind (as tests have shown) will force the mass of snow beyond the railway cut.

This method of struggle against snowdrifts is already in use on the railways of Siberia.

Mastery of the complex of temperature and humidity is a further complication of the methods of laboratory climate. Progress is being made in determining the hardness of various crops under conditions of frost, heat, and drought. This calls for highly scientific regulation of the temperature of the air. With the laboratory's "frost machine" it is possible to obtain, without leaving Moscow, a thermic and hydrometric soil regime which corresponds exactly to the soil regime of, let us say, Station Skovorodniki on the Ussuriisk railway in the Far East.

Frost on the Wheat

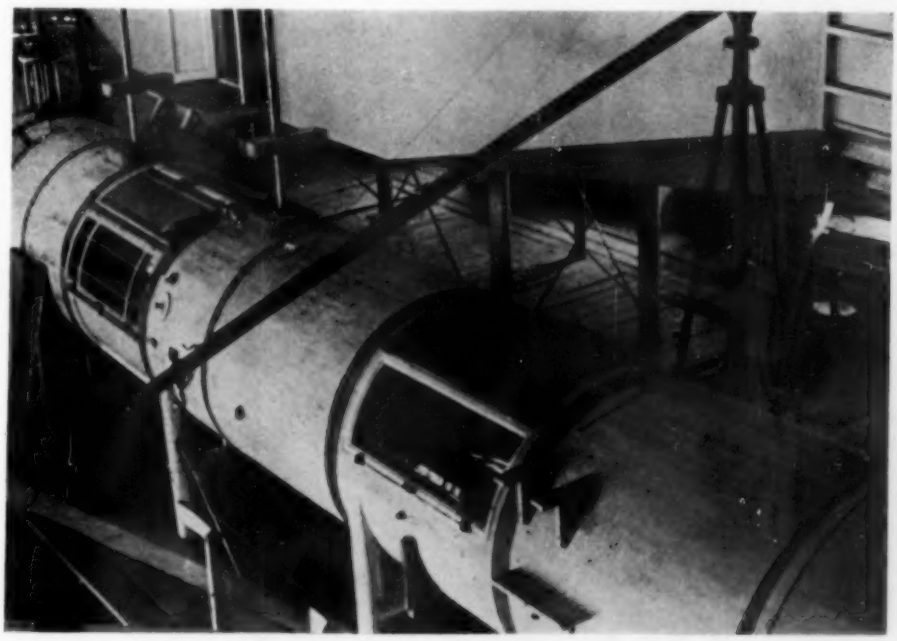
Glazed frost and ice-crust on winter wheat is an extremely widespread phenomenon in the Ukraine; but up to this time it has never been studied. In the Moscow Laboratory of Climate the experimenter obtains ice-crusted wheat stalks for study, without waiting for weather conditions.

There is yet another original problem in which the Moscow Laboratory of Climate has done important work—the testing of lubricants. At the laboratory is a railway car bearing-box inside of which is mounted the greased end of the axle. The qualities of lubricating grease in different seasons of the year and in various geographical zones can be studied under every imaginable climatic condition by creating in the room corresponding climatic regimes, which vary from the awful cold of Siberia in the dead of winter to the tropical heat of Central Asia in July and August, while day and night the axle rolls "on its way."

Control Chamber

There are still more complex apparata in which experiments are enlarged upon. One is an aero-dynamic tube, having in the upper part a testing section and in the lower part a chamber for conditioning the air temperature. Humidity and wind-velocity are obtained in the testing chamber.

The control system of the measuring instruments is comparatively simple, especially the "three-element" switchboard. Heating, cooling, dampening and drying aggregates are put into operation on a very wide range. (*Turn page.*)



WIND TUNNELS

Here, through the windows, Soviet scientists watch the effects of bitter winds upon masses of snow.

By subjecting various kinds of fabrics to these tests, the Moscow Laboratory of Climate assists in creating the most convenient and appropriate clothing for all kinds of industrial conditions.

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GENERAL SCIENCE

Technical Encyclopedia Serves Practical Persons

IT HAS been more than two decades since an encyclopedia devoted exclusively to technical and scientific matters has appeared. Now the needs of teachers, students, artisans and even scientists is served by 2,468 pages, some 25,000 titles, and thousands of illustrations in a four volume British-written work, *Hutchinson's Technical and Scientific Encyclopedia,* edited by C. F. Tweney and I. P. Shirshov (Macmillan).

Browsing through these volumes, many unfamiliar words tease one's ignorance. The last volume is labeled: "Petrol Engines to Zymurgy." Petrol engines is easy if one knows a little British; it means "gasoline engines" as gasoline to the British is "petrol."

Zymurgy? Easy—"the branch of technical chemistry which deals with processes of fermentation. See Brewing; Fermentation."

At the very beginning of the book—what? A. You know what that means? Do you?

"A (Astron.) A band in the solar spectrum produced mainly by oxygen in the terrestrial atmosphere; named by Fraunhofer."

Open the fourth volume to its center:

"Slicker (Leather Manufac.)—A tool used in leather manufacture for setting-out, smoothing, or stretching leather. May be made of brass, slate, stone or vulcanite."

Gangway

And in the middle of volume 2:

"Gangway (Mining)—A main haulage road or main level."

One might go on picking out item after item from this comprehensive work. The electrical sciences, chemistry and engineering are particularly well covered. The longest articles on the more basic principles of the sciences are less elaborate and academic than those found in a larger work like the Britannica but serve well the more practically-minded audience for which the volumes are intended.

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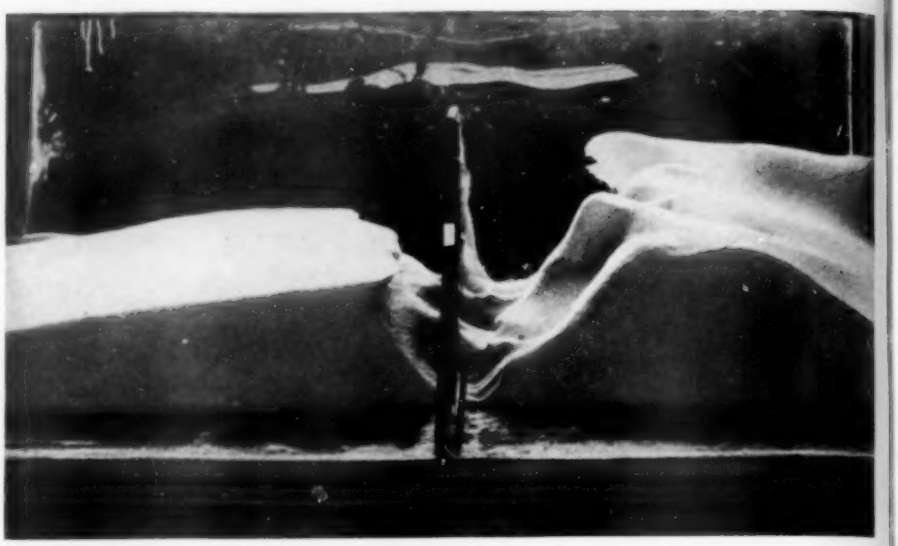
The ancient Chinese, and later the Romans, cultivated oysters.



DRIFTED HIGH

Snow piles high against this snow fence in the Laboratory of Climate in Moscow.

MEDICINE

Waste Product Heals Wounds By Stimulating Growth

UREA, ordinarily considered a waste product of the body, is good medicine for slow-healing wounds. Its successful use on patients by physicians all over the country is reported by Dr. William Robinson, entomologist of the U.S. Department of Agriculture (*American Journal of Surgery*).

A two per cent solution of urea, made with sterile water, is applied directly to the wound. Relief of pain and rapid healing has followed in cases of varicose and diabetic ulcers, carbuncles, extensive infected burns, mouth infections, osteomyelitis and certain skin infections. No ill results have so far been reported from this use of urea, and its low cost, about fifty cents a pound, makes its extensive use quite practicable. The solution is bland, colorless and odorless, and as used medicinally comes from a manufactured product having no connection with body wastes.

The urea solution apparently achieves its effect by stimulating a "vigorous growth" of new tissue with abundant blood supply. It does not have any direct germ-killing effect on the organisms involved in chronic, pus-forming wounds. Its cleansing effect on these wounds is produced indirectly through the stimulation of the growth of new healthy tissue.

The healing effect of urea was discovered through investigations Dr. Robinson made of maggots. A war-time discovery by the late Dr. William S. Baer, American surgeon, showed that these tiny creatures, loathsome as they might seem when crawling around in an open wound, had the power to clean up the wound and stimulate healing of the tissues. Dr. Baer died before he could find why the maggots in many cases surpassed other means of healing wounds. Government scientists continued his work, breeding clean, germ-free maggots and studying them. First clue to the maggots' healing power was the discovery that they produced allantoin, which in itself is a healing agent.

Further study showed that this was not the only substance with healing power present in maggot excretions. The chemical structure of allantoin suggested the possibility that urea, which can be formed by adding hydrogen to one of the chemical groups that make up allantoin, might be the active agent with which maggots were healing wounds. Whether or not this is the case, the suggestion led scientists to a trial of urea itself, with the success reported by Dr. Robinson.

Urea can be made by combining am-

monia with carbon dioxide. It occurs in human tissues and also is of common occurrence in plants. Its rather distasteful name comes from the fact that it was first discovered in one of the body's waste products. If, as Dr. Robinson points out, it had first been discovered in spinach, where it also occurs, it would probably have a better-sounding name.

Science News Letter, August 15, 1936

GENETICS

Cancer-Like Disease of Blood Follows Mendelian Law

Leukemia, Highly Fatal Disease, Is Due to Wild Growth of White Blood Cells and Determined by Heredity

CANCER-LIKE behavior on the part of the white blood corpuscles, a wild uncontrolled growth that turns them from their normal role of "cops" to the malignant one of "robbers," follows a definite hereditary pattern, Dr. E. C. MacDowell of the Carnegie Institution of Washington has discovered, in the course of researches conducted at the Institution's Department of Genetics.

Leukemia, the disease is called in medical circles. The name is Greek for "white blood," because of the terrific excess of white blood corpuscles that crowd the circulatory system and congest the vital organs. Because the white blood corpuscles are free to move about the body, leukemia is not susceptible to the kinds of treatment that can eradicate or check malignant tumors occurring in the "stationary" tissues. Hence leukemia is a highly fatal disease.

In his efforts to learn the causes of leukemia, Dr. MacDowell has worked with mice instead of men, for a number of obvious reasons. By the closest kind of inbreeding, he has produced a leukemic strain of black mice, of which it can be confidently predicted that only one individual in ten will escape the disease. By similarly close inbreeding, he has produced another strain, light-colored, of which only one in a hundred develops it. He has carried this breeding of leukemic and non-leukemic mice through 36 mouse generations—equivalent to over a thousand years, in terms of human generations.

When mice of the two strains are crossed, about half the offspring become leukemic, and the other half do not, although all the hybrids have the hereditary factor that makes for the development of the disease.

Dr. MacDowell interprets these results as meaning that in the "pure-line" leukemic mice heredity is so strong a factor that environmental influences cannot avail to check it; as if fated, the mouse develops the disease regardless. But in the hybrids, the hereditary dose of doom is not so large, so that some of the individuals respond to ameliorating factors in the environment and the malady does not develop.

As Dr. MacDowell phrases it: "Putting all this together, we find evidence that wild growth does not depend merely upon a change in the cells, but also upon the relation of this change to the growth-controlling forces of the particular individual. . . . Heredity sets limits, environment decides the exact position within these limits."

Dr. MacDowell's researches were conducted in cooperation with the Department of Pathology at Columbia University, supported by funds supplied by the Carnegie Corporation of New York.

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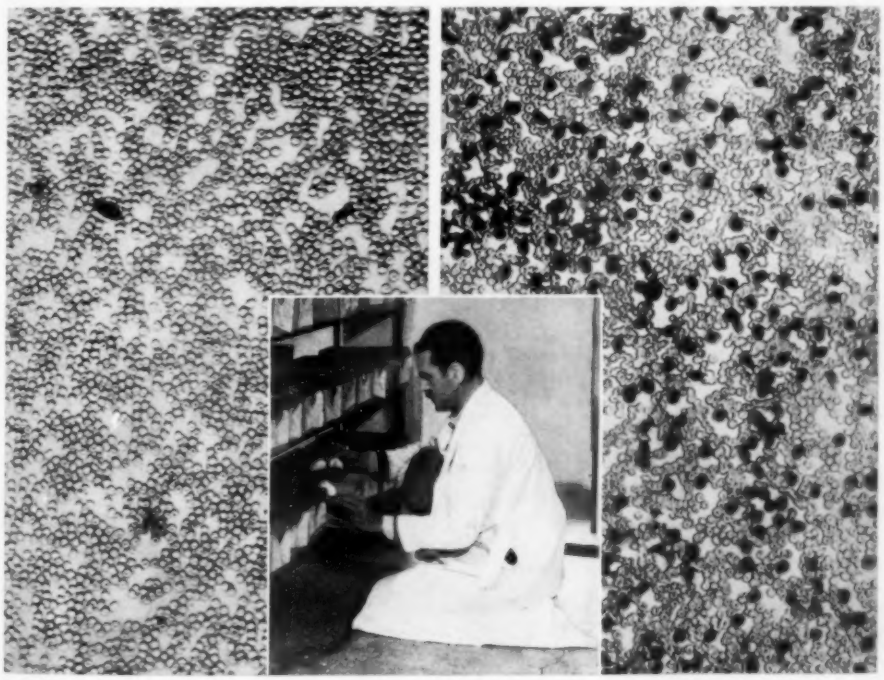

HEALTH AND DISEASE

Dr. E. C. MacDowell in his leukemia laboratory at Cold Spring Harbor, N. Y. Left background: Highly magnified photograph of normal blood. Right background: Blood of leukemic mice on the same scale. Note the large number of cells that show black in the leukemic blood. These are white blood cells that were stained dark to make them prominent in the photomicrograph. The small cells are red blood corpulscles.

CHEMISTRY

Six "Synthetic Rubbers" Now on the Market

OUTSIDE of the technical industries concerned, most people may yet feel that "synthetic rubber," or rubber-like material, is still a laboratory curiosity and still in the Sunday science supplement stage of the newspapers. How many know, for example, that six products now on the American market are rivals of rubber? Some are true synthetics, built in the laboratory, while others are derived from natural rubber but have special and desirable properties. They are described in the *Bulletin of American Society for Testing Materials* (July).

Pioneer of the rubber-like substances is Thiokol, which is available in sheets, as a liquid, or as a powder for molding.

Like rubber it can be vulcanized but has the additional valuable property of being impervious to gasoline and does not swell and quickly disintegrate.

Koroseal is the rubber-like plastic with properties that make it desirable where natural rubber fails. It can be obtained in hardness that runs all the way from a soft jelly to hard rubber. You can mold it, make sheets out of it or extrude it from openings. Remarkable resistance to light, water, air and certain corrosive chemicals and oils are its merits. Chief use is in the impregnation or coating of fabrics, paper and metals.

AXF is another rubber-like synthetic organic compound which makes hard rubber flexible and aids in overcoming the deterioration due to ozone.

DuPrene is one of the newest and most widely known synthetic products having rubber-like properties, which has greater resistance to oil, grease, gasoline and air and heat than natural rubber. Tires have already been built with it and performed satisfactorily. Leather, fabrics, asbestos and cork have already been coated with it for special service.

Plioform is a rubber derivative made from pale crepe rubber. It resists the attack of water, all alkalies and most acids. It has excellent electrical insulation properties. This plastic has wide usefulness in the field of sound production. When used as a sounding board, it approaches violin wood in producing pleasing tones.

Sixth of the rubber-like materials is Tornesite, a rubber derivative, whose present function is primarily in the coating of metals. It shows resistance to acids, alkalies, smoke and fumes and can be applied with a brush or as a spray.

In the commercial sense there is little reason why the synthetic rubber-like plastics should exactly duplicate the natural products. While the search for synthetic rubber originally had that goal, the present products have excelled rubber in many ways and lack only the price angle to be highly competitive on a wide scale.

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PUBLIC HEALTH

Campaign to Save Lives Of Premature Infants

A CAMPAIGN to save the lives of premature infants is being waged by the Chicago Board of Health. Dr. Herman N. Bundesen, president, regards this as the most promising field of effort for the further reduction of the infant death rate.

The first measure taken by the city was a careful survey of all the hospitals. These institutions are now rated on their facilities such as "premature" nurseries, heated beds and equipment for the administration of oxygen.

Next the board of health passed a regulation making premature births reportable at once by telephone. As soon as such a birth is reported, a nurse is dispatched to help the doctor.

The board of health provides an incubator ambulance to transport these infants, without charge, from homes to good hospitals. Heated beds are sent to homes when hospital care is not given.

Chicago's next step was to establish a mother's milk station where breast milk is collected and made available for premature and other infants who need it and whose parents are unable to pay for it.

Finally, a simply worded booklet on the care of the premature baby is sent to the mother.

A survey, conducted during 1935 of the death of every Chicago infant under 30 days old, is reported on in the *Journal of the American Medical Association* (July 25).

This survey shows that most of the mothers of these infants did not have proper care before the child's birth. Unrecognized and untreated disease conditions in the mother endangered the life of the infant.

Dr. Bundesen and his associates also found that in more than half of the cases the drugs given the mother preceding and during childbirth were questionably administered. The peril is especially grave, they contend, when large doses of analgesics are given to abolish the pains of labor.

Almost 70 per cent of the deaths of premature infants in Chicago during 1935 occurred within the first twenty-four hours. This is almost double the percentage of full-term infants who died during the first twenty-four hours.

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ARCHAEOLOGY

Palaces of King Darius Yield Magnificent Art

See Front Cover

MAGNIFICENT sculptures portraying King Darius the Great on his throne have been unearthed from the ruins of his famous palaces at Persepolis.

Word of the discovery has just been received at the Oriental Institute of the University of Chicago. The Institute's expedition to Persepolis reports that the sculptures are among the finest examples of ancient art yet found.

The sculptured scenes adorned two porticos of a courtyard and represented King Darius giving audience to some petitioner, says Dr. Erich F. Schmidt, field director of the expedition. King Darius and his son and heir, Xerxes, are shown giant-size, seven feet tall, to increase their majesty. The petitioner and the courtiers are ordinary life-size. Attendants include the carrier of the royal bow and mace, two lance carriers, and a man believed to be the Food Taster, who is holding a napkin.

Important clues to the burning of the Persian palaces by the conqueror Alexander the Great, in 330 B.C., have been discovered, Dr. Schmidt reports. Telltale silver coins bearing Alexander's head prove that the palace was occupied or

LIKE LEATHER

This sword and scabbard are not of leather and metal but carved in stone upon the panel shown in the view on the facing page. They are worn by a guard standing behind the king and his son.

PALACE TERRACE

Here was discovered a beautiful panel showing King Darius the Great seated upon his throne with his son, Xerxes, standing near. You may see the panel on the center left. In the right background is the Expedition house, once the harem palace of Darius.

preserved until Alexander's soldiers set torches to the beautiful city of Persepolis, according to legend, in a drunken carouse. The coins were found in a palace courtyard, where one of Alexander's men must have lost them.

Another important piece of evidence, possibly explaining Alexander's rage, is the headless marble torso of a woman found lying in a passage. The lovely statue, reminiscent of Parthenon figures in Athens, may have been one of Xerxes' trophies from the sacking of Athens, Dr. Schmidt suggests. If such reminders met Alexander's eye in Persepolis, his order to burn up the place may be understood.

So rich in buried history is the neighborhood of Persepolis that Dr. Schmidt enthusiastically calls it "an archaeological paradise."

The cover picture shows the tomb of Darius I.

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MEDICINE

Single Treatment Restores Delirium Tremens Patient

DELIRIUM TREMENS, a "dramatic incident" in the life of a chronic alcoholic, frequently leads the drinker either to the hospital for the insane or to the cemetery.

How he can avoid both of those places and receive simple treatment in the ordinary local general hospital is told by two psychiatrists, Drs. William N. Cline, Jr., and Jules V. Coleman of Grasslands Hospital, Valhalla, N. Y. (*Journal, American Medical Association,* Aug. 8).

The modified Steinbach treatment which they recommend has sharply reduced the death rate among chronic alcoholics in the last two years at the psychiatric institute connected with Grasslands Hospital. This rational treatment can be undertaken at any general hospital.

Delirium tremens arises from an acute swelling or fluid in the brain tissues with increased pressure in the skull. The treatment used successfully by Drs. Cline and Coleman is to dehydrate the cerebrum by means of spinal drainage, meanwhile limiting the patient's intake of water for a brief period and giving him a sedative that will induce sleep.

A single application of this treatment is usually enough to return the man with "snakes in his boots" to his normal physical state.

These two physicians deplore the still common use of alcohol in the treatment of alcoholism. The tapering-off treatment is futile and inadvisable, they declare, and the psychological effect on the patient is harmful.

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SEISMOLOGY

First Earthquake Recorder To be Placed in Museum

THE first earthquake recorder in the United States, placed in service at Lick Observatory at the University of California in 1886, will soon go on display at the museum of The Franklin Institute.

The Lick Observatory instrument was one of the few in California at the time of the disastrous 'quake in San Francisco on April 18, 1906. The Observatory is only 45 miles away from San Francisco. The original record of this severe and damaging shock is still preserved and shows that while the vibrations threw the recording mechanism off the tracing paper, the apparatus functioned unharmed.

The instrument is known as a Ewing three-component seismograph. It was the invention of Prof. J. A. Ewing, of Dundee, Scotland, and the first description was published in *Nature,* a leading British scientific journal, on August 12, 1886. Two heavy weights, mounted to swing like a gate, are connected by levers to pointed arms which rest on a glass disk 24 inches in diameter which has been covered with soot. One weight is free to swing in an east and west direction, the other north and south. When the earth shakes under the instrument, the entire machine moves, but the weights tend to stand still.

A similar effect can be observed if a coin is laid on a piece of paper, and the paper suddenly jerked away. The coin does not move with the paper, but merely drops. This relative motion between the weights and the instrument makes the pointed lever move back and forth over the disk, which is slowly rotating, like a phonograph turn-table. In this way, successive swings of the lever do not obliterate the others. Another weight, balanced on the end of a spring, and free to swing up and down, records in a similar way the vertical movement of the ground.

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PUBLIC HEALTH

Infantile Paralysis Cases Increase Due to Season

LATEST reports received by the U.S. Public Health Service show a fresh increase in infantile paralysis cases, the total for the country reaching 142 during the week of August 1. The increase is chiefly due to sporadic cases in various parts of the country, rather than to an increase of the outbreak in the Southern states. These cases are seen as part of the usual seasonal rise and are not considered a result of the earlier outbreak in the South.

Of the Southern states chiefly affected, Tennessee had an increase, with 26 cases for the week, but Alabama, with 29, and Mississippi, with 5, showed decreases over the previous week. California reported 16 cases, Illinois 12 and New York 6, with from 3 to 6 each reported in Minnesota, North Dakota and Nebraska.

The picric acid-alum spray has been used widely, many laymen spraying their own noses and those of their friends and neighbors. No reports on its effectiveness are yet available at the headquarters of the U.S. Public Health Service, but it is expected that some months hence when the history of this epidemic is written, some conclusion can be drawn as to its effectiveness as a preventive measure.

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ENGINEERING

Telephones to "Translate" For Power Conference

THE CONTINENTAL European practice of holding conferences in several languages will be followed at the coming meeting of the Third World Power Conference to be held in Washington, D.C., September 7 to 12. Multiple telephone plugs will make the new departure in American science meetings possible.

The temporary seat of each delegate, foreign or American, will be provided with multiple holes into which a telephone plug can be inserted so that the delegate can hear an address, in any one of the official languages employed which he understands.

When a South American delegate, for example, is using Spanish for his address, the other delegates may plug in an interpreter reading his speech in French, German or in English.

The enormous task of translating and printing the addresses of all scheduled speakers is now under way at the Conference headquarters. At the seat of every delegate will be copies of all addresses in one of the four languages which he can understand.

As a result, the actual conference time of the meeting will not be employed in listening to the prepared discourses of the scheduled speaking delegates but can be devoted to the much more important task of discussion.

Dr. William Durand, noted California scientist who has devoted his life to marine and aeronautical engineering and who will serve as Chairman of the Conference, will have little linguistic difficulty. Dr. Durand will present his address of welcome in four languages—French, English, German and Spanish.

Science News Letter, August 15, 1936

ENGINEERING

Air Conditioning Brings Increased Fire Hazards

DEVELOPMENTS in modern building construction and the ever present demand for greater comfort and luxury are bringing about conditions which tend to seriously increase fire and life hazards. Fast becoming an industry in itself, the spread of air-conditioning is creating a problem which renders fire-fighting operations extremely difficult.

Explaining how a fire may quickly gain headway in a building by means of the vertical shafts and connecting horizontal ducts of air-conditioning systems, George Booth, chief engineer of the National Board of Fire Underwriters, New York, pointed out to members of the International Fire Chiefs' Association that all agencies charged with the safeguarding of public safety must be constantly alert and informed about developments in air-conditioning and that they must see that all reasonable demands for fire prevention and protection be complied with.

New regulations about to be issued by the fire underwriters will require the installation of dampers at the top and bottom of vertical shafts in air-conditioning systems and also in horizontal ducts where these pass through fire partitions. These dampers must be so arranged that by means of a fusible link or other heat actuated device they will close automatically in case of a fire. The new regulations will also make provision that all air filters and linings in the ducts designed to combat vibration noise be of fireproof or fire resisting materials.

Science News Letter, August 15, 1936

IN SCIE

ASTRONOMY

Franklin Institute Aids Amateur Star Gazers

IT IS highly possible that Philadelphia may some day boast of an amateur astronomer discovering a new comet, star or nova, according to James Stokley, associate director of The Franklin Institute in charge of astronomy.

For the past few months Mr. Stokley has been welcoming many amateur astronomers to the Institute, where, under the supervision of expert amateur and professional students of the stars, they have been grinding telescope mirrors and building instruments with enthusiasm.

"The Institute," said Mr. Stokley, "has set aside a complete workshop for these amateurs where they may spend all the time they wish. Dozens of telescopes are now in the course of construction. Periodic visits to the Fels Planetarium and the fine public Observatory of the Institute serve to bring the average layman closer to the majesty of the heavens."

"Amateurs in astronomy," continued Mr. Stokley, "are contributing invaluable material toward the furtherance of this science and are also rendering much important aid and information to the professional. There is definite work to which thousands of amateurs contribute their observations. This is principally in keeping an almost continual watch over the variable stars which are always changing in brightness.

"The professional astronomer must necessarily confine his attention to certain particular phases of the science, but the amateur is better able to watch over broader areas, and thus, when anything unusual, like a new star or a comet occurs, he may notice it before the professional. Thus, Peltier has contributed five new comets and a new star in little more than ten years, and a few years ago a Japanese melon-patch worker in California found another comet. This requires a very thorough knowledge of the constellations, and the stars and other objects in them, so that anything strange may be recognized at once."

Science News Letter, August 15, 1936

IEE FIELDS

METEOROLOGY

Worst Drought in History, Weather Bureau Verdict

"THE drought in the interior of the country this year is measurably more severe than any other of record in the climatological history of the country" is the basic conclusion of the weekly summary of crop reports issued by the U.S. Weather Bureau.

With four months of the growing season now over, the present plant growth period is the driest on record in eight interior states: North Dakota, South Dakota, Minnesota, Wisconsin, Iowa, Missouri, Illinois and Indiana. It is the second driest on record in Ohio, Kentucky, Oklahoma, Kansas and Montana.

The last crucial seven days, reports the Weather Bureau, showed a break in the severe July heat but no rain except locally through the Midwest. Throughout the corn belt the chief crop is bad and steadily deteriorating.

Cotton is generally favorable with the rains of the last week helping the southeastern section.

Science News Letter, August 15, 1936

PHYSIOLOGY

Garlic Breath Comes From Blood Via the Lungs

THE SCENT of garlic heavy on their breath, subway and surface car riders go their way, all unconscious of the scientific controversy being waged over them.

A short year ago, Dr. Howard W. Haggard and L. A. Greenberg of Yale University announced to a waiting, but not a breathless world, that garlic and onion odors issue not from the blood by way of the lungs, as had been previously held, but arise solely from particles of onion and garlic retained in the structures of the mouth.

All the garlic eater needed to do, said they, was to wash the mouth and tongue with chloramine, and presto, his breath was as sweet as new-mown hay.

Now come Drs. M. A. Blankenhorn and C. E. Richards of the department of internal medicine, University of Cincinnati, with three selected subjects who, they claim, disprove all that.

These men, from various causes, were no longer able to take food by mouth, but had to be fed through man-made openings in the body. Moreover, one of them could not exhale the breath through the mouth. Yet when fed the offending substance, the scent of garlic clung to them still, after from six to twelve hours.

Not content with this evidence, the Cincinnati doctors fed a salad containing garlic to three normal persons, and eighteen hours later they still smelled of it. Each then had his mouth washed out with chloramine, and there was no longer any smell of garlic—not for half an hour or so. After that the garlic odor was detected by all who sniffed the immediate air.

These four tests, says Cincinnati to Yale, prove that garlic and onion breath odors do come from the blood by way of the lungs. They further prove, it is charged, that chloramine merely masks the odor temporarily and does not cure it.

Science News Letter, August 15, 1936

MUSIC-PHYSICS

To Broadcast True A as Standard Musical Note

"SOUND your A"—the phrase so well known to musicians—will take on new significance on Aug. 29, when the National Bureau of Standards starts a two-week test broadcast of sending out continuously, night and day, the four hundred cycle note that is A on the piano.

The broadcast will be held at the request of musical organizations who feel that they need a really accurate and true-pitch A. Musical instrument makers, piano tuners and others who have need for an accurate standard of pitch are asked to write the radio section of the Bureau for further details and comment on the new service. Depending on the two weeks test, the Bureau may arrange for an extension of the musicians' service.

Only time, day or night, when the "A" will not be broadcast will be Tuesday, Wednesday and Friday from noon to 3:30 p.m., E.S.T. While the older receiving sets may not pick up the signals, the newer sets and the "short wave" or "all wave" receivers will. Transmission will be on 5,000, 10,000 and 15,000 kilocycles per second.

Science News Letter, August 15, 1936

ASTRONOMY

New Comet Loses Tail Puzzling the Astronomers

DISAPPEARANCE of the tail of the Peltier comet now streaking across the southeast sky, as reported at the Yerkes Observatory of the University of Chicago, adds another mystery to the long history of comets.

The Peltier comet made its nearest approach to the earth Aug. 4, when it was only 16,000,000 miles away.

Biela's comet is perhaps the most famous of all comet mysteries. In 1846 it split into two parts and the two parts traveled side by side for some months. Returning in 1852, the two parts were separated by about 1,500,000 miles. But neither of them has ever been seen since then, although astronomers estimate that they must have returned to the region of the sun and earth at least ten times.

Holmes' comet of 1892 was large and bright when discovered in November of that year, but by December it had doubled its size and become almost transparent. Then in January it suddenly contracted again and showed a large nucleus.

Science News Letter, August 15, 1936

VITAL STATISTICS

Suicides on Decline During Past 6 Months

A NEW drop in the suicide death rate among insured wage-earners is in prospect for this year, if the better record of the first half of this year is maintained.

Figures compiled by Metropolitan Life Insurance Co. statisticians show that the suicide rate was 8.9 per 100,000 during the past six months. If this continues, it will mean a drop of one-sixth in the brief space of four years. In 1932, suicides reached the highest point recorded since 1915.

The fact that the increase in suicides reached its peak at the very height of the depression caused some speculation as to whether economic conditions influenced self-destruction. Dr. Louis I. Dublin, Metropolitan's statistician-vice-president, points out that it is equally significant that the suicide rate rose steadily in the feverishly prosperous years immediately preceding the depression. He concluded that neither upward nor downward trends in suicide result solely from economic causes.

Science News Letter, August 15, 1936

PHYSIOLOGY-BOTANY

Pollinosis

You May Not Recognize That Name, But You Or Your Relatives and Friends Know It as Hay Fever

By DR. FRANK THONE

RAGWEEDS ripen by the hour. Already their time of blossoming has begun, sweeping in a great wave from the Canadian border to the Gulf, during the weeks from early August until late October. Sneezes and redness of eye sweep in a great wave with the wave of blossoming; for the air will be full of their pollen grains, which to most hayfever sufferers are objects of dread worse than the germs of any plague.

True, there has been hayfever in the land already, ever since the first days of spring. From frost to frost there is always pollen of some kind in the air, and many persons are sensitive to some of the early pollens, especially certain tree pollens, grass pollens, and the pollen of the narrow-leaved plantain.

But there are more sufferers from ragweed pollen than from all other kinds put together. So traditionally hayfever season is the same as ragweed season.

It seems strange, at first glance, that of all the scores of thousands of kinds of pollen, the grains from just one genus of plants should be singled out to bear such a curse. But a little closer look at the situation at least partly clears up the mystery.

Must Be Sensitized

To begin with, no susceptible person begins sneezing the moment he is first exposed to a pollen species. He must first be "sensitized" by getting a considerable dose into his system, under the right circumstances—which are by no means fully understood as yet. After that, very small subsequent doses will serve to set him off.

That being the case, it would follow that the kind of pollen most abundant in the air, for the longest time, would have the largest probability first of sensitizing the most victims and then of finding them on subsequent occasions and causing them to suffer.

Ragweed fits into this hypothesis like a hand into a glove. It is an exceedingly abundant weed, and its pollen production per plant, and per acre of infested land, is simply terrific. One specialist in the problem of hayfever pollens, Oren C. Durham, gives in his new book, "Your Hay Fever," an estimate of one million tons a year as the American ragweed pollen crop. Actual ragweed pollen counts from most American cities outnumber all other pollens added together by ten to one. Small wonder that this one kind of pestiferous dust should find, sensitize, and persistently torment so many victims!

Yet the picture is not quite so simple as all that. The hayfever importance of a given kind of pollen is not in direct proportion to its abundance in the air. Some kinds of air-borne pollens, pine for example, are exceedingly abundant at certain seasons; yet there are relatively few sufferers from pine pollinosis. Your pollen must not only be abundant, it must have a specific "cussedness." Pollen grains are like bacteria in this, at least: some of them are both abundant and vicious, while others may be equally abundant yet have no harm in them.

May Be Hereditary

Finally, not everyone is susceptible to the action of pollens. Susceptibility is a great mystery still, for all the scientific scrutiny that has been bent on the question. However, there does seem to be something hereditary about it, at least in some families. If your ancestors had hayfever, you may possibly become a victim. If you come of a hayfever-free stock, you may escape. But lest you jump at the conclusion that it's all like the old-fashioned doctrine of predestination—that you were either damned or saved from the hour of your birth, and nothing you could do could change it—it must be hastily added that this hayfever-heredity doctrine is not a dogmatic certainty, either. Maybe we'll know, some day; just now we know only in part, and so can prophesy only in part.

The whole story of hayfever and its relation to pollens of various kinds is too long and complex to tell in one short article. Books can be written about it. They have been written: the one by Mr. Durham, just mentioned, makes hayfever interesting and even exciting reading—except possibly to victims during their time of suffering, when nothing can possibly be interesting, except the prospects of an early frost. Another excellent book, also just off the press, is called simply "Pollen Grains." It is by Dr. R. P. Wodehouse, who directs a hayfever laboratory maintained by one of the great chemical companies. This second book goes into considerable detail on other scientific angles besides the hayfever one.

Essential to Life

For there is a lot to pollen besides hayfever. Most of us realize that, of course. We all know that all common plants (except ferns and mosses) produce it, and that it is carried from flower to flower, to make possible the production of seeds and fruits. And since all of us are dependent on plants for our continued existence, it can validly be argued that pollen is an indispensable link in the chain of life—even to hayfever victims who feel that the pesky dust is going to be the death of them.

There has been a vast deal of very bad natural history spilled into the air about pollen, particularly by nice, well-

TALL

Giant ragweed does not belie its name. This is only average height.

SOME PICK IT

Harvesting low ragweed from a thick-grown weed patch. The pollen will be carefully gathered in the laboratory, and used in the preparation of an extract for hayfever prevention.

intentioned people instructing children in what their own euphemism terms "the facts of life." The pollen grain is not the exact analogue of the male germ cell in animals and human beings, and it does not fertilize the flower and start seed production by the simple act of falling into it or being carried in by an insect. It is not so simple as all that.

How It Happens

When a pollen grain is left on exactly the right place on the tip of the pistil of a flower (botanists call it the "stigma"), the living protoplasm within the grain breaks through the thin, horny outer coat and starts to grow down through the tissues of the pistil, like an exceedingly fine little root growing down through the soil. Drawn by an irresistible chemical guide, this "pollen tube," as it is called, approaches the female germ cell, or egg nucleus. Then, and then only, is the male pollen nucleus released, to unite with the egg cell; and the new combined nucleus begins the long process of divisions and development that finally result in the curled-up little plant embryo within the seed, and in the little packet of reserve food stored in or around it. These are, in shorthand outline, the essential facts about pollen action—a subject, again, on which thick books have been written.

Once a pollen grain gets to the stigma of the flower, its action is fairly dependable. The critical job is getting the pollen across the gap—sometimes only the fraction of an inch, sometimes miles—that separates the pollen-producing flowerpart, or stamen, from the female or seed-producing organs.

We have all heard the fascinating story of cooperation between insects and flowers: how the flower baits bees, butterflies, even beetles and flies, with bright colors, sweet scents, and the reward of nectar to eat, and how they then unwittingly carry the fertilizing grains on their hairy bodies to other flowers.

This is a really economical way of dealing with the problem of pollen transfer, and flowers that thus depend on insects do not need to produce so much pollen. What they do produce, however, is of a special kind, with large, heavy, usually sticky grains, so that they will adhere the better to the coats of the insects.

In Orchids

Tropical orchids reach the ultimate limit in this kind of thing: they produce all their thousands of grains lumped together into two large, sticky masses, which a special trigger apparatus slaps against the side of the visitor (sometimes a hummingbird instead of an insect!) to be carried to the next orchid and there picked off again by an apparatus just as specialized.

At the opposite extreme from this all-eggs-in-one-basket system of the orchids is the method of all the plants that figure in the hayfever situation. These produce millions of times as many pollen grains as ever will find their tiny living targets, and simply throw them into the air for the wind to carry like any other dust. It is the barrage system, in which only one missile in millions ever hits anything important.

Wasteful But Effective

Like the barrage system of artillery fire, wind pollination is exceedingly wasteful, yet exceedingly effective. The world's most successful plants use it. No one can deny that the ragweeds are successful—from their own point of view, whatever might be said from ours. The great forests of the world—pines, spruces, oaks, beeches, practically all nut trees—are wind pollinated. Finally, and most important for us, the whole great grass family, which includes everything from lowly pasture grass through the grains to the towering bamboos of the tropics, depends on the wind to carry its pollen. Thus we depend on wind-pollinated plants for our daily bread, butter and meat, for our houses and at least some of our fuel, for the very paper you are reading at this moment and maybe for some of the rayon garments you are wearing.

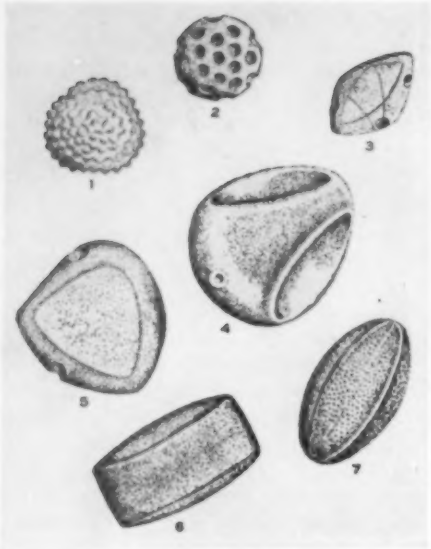
There are other ways of distributing pollen, too: some water plants, for example, set their pollen adrift on the water instead of casting it into the air. But the major means are either insects or air currents.

Wide Range of Size

Naturally, pollens that perform in so many different ways have many different shapes and sizes. The range of size alone is very great; an array from giant grains like those of the cucumber family down to the midgets of the family, like those of the ragweeds, reminds one a little of a size-scale chart of the planets, from giant Jupiter down to midget Mercury.

Pollen grain shapes may be thought of as all based on a sphere. Many of them retain that shape—simple smooth round objects like a child's play-ball in miniature. Others have been pulled out into torpedo- or cigar-shapes, or squashed flat into drum-shapes, or dented in as a soft rubber ball can be deeply creased with the fingers. Many, perhaps most, are marked in various ways: the ragweed pollens have innumerable little warts all over them, Russian thistle pollen is pitted like a golf ball, muskmelon pollen is studded with little points or prickles.

Size in pollen grains is highly important. For successful wind pollination, as a rule the grains must be quite small.



HOW IT LOOKS

These are pollen granules, very highly magnified. 1. Common Ragweed. 2. Russian thistle. 3. Hemp. 4. Corn. 5. Hickory. 6. Oak. 7. Sagebrush. (From Durham's "Your Hay Fever")

The bigger the grain the more rapidly it will fall through the air. So we find the smallest pollens are the most abundant in the air: ragweed, practically all the grasses, most of the hardwood trees.

The wind-borne pollens of pines and other similar evergreens are an exception to this rule. They, however, achieve buoyancy through another mechanism. Their moderately large grains are each equipped with a pair of hollow air sacs, that look very much like waterwings, and perform in the air very much as waterwings do for timid swimming pupils in the water.

Wind-pollination, for all it seems a hit-or-miss (usually miss) method, must not be for that reason only thought of as a mark of primitiveness in plants, or a sign of low place on the evolutionary scale. True, hardwood trees are usually assigned a spot near the bottom of evolutionary lineups among plants, and orchids, which are as far removed as possible from wind-pollination, are set at the top of their particular division of the plant kingdom. But grasses are also rather advanced plants, evolutionally speaking; and the most prolific of all wind-pollinators, the pesky but successful ragweeds, are composites, and thus among the very aristocracy of plants. They are, indeed, unacknowledged but close cousins of the sunflower—which at least one of our great political parties will tell you without hesitation is the noblest of all vegetables.

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Science News Letter, August 15, 1936

ASTRONOMY

Radio Data From Eclipse Seem Unlikely To Be of Much Value

HOPES that radio observations of the recent eclipse of the sun on June 19 in Siberia would be highly valuable were dimmed when scientists at the National Bureau of Standards revealed results of experiments made in Washington during the eclipse period. Although few people realized it, a great magnetic storm struck the world just before and during the eclipse.

Despite general cloudiness and other unfavorable weather conditions, which ruined the visual and photographic observations of many eclipse expeditions from the United States and other nations, it was generally felt that the radio observations would be successful.

There was world-wide cooperation on the radio tests on the recent eclipse. While scientists on the eclipse path were taking their observations of the reflections of radio signals from the ionizing layers miles above the earth's surface, scientists S. S. Kirby, T. R. Gilliland, N. Smith and S. E. Reymer in Washington took similar measurements which were to establish the normal pattern of the world's radio "roof" half way round the world. Thus, it was hoped, the effect on the layers of the moon's shadow due to the eclipse could better be ascertained.

What decreases the hopes that the eclipse radio observations will be of value is the discovery that on the two days preceding the eclipse, the eclipse day itself and the following day, the ionizing layers indicated a severe magnetic storm which made the whole world picture a greatly abnormal one.

Even if the actual observations in the eclipse zone are different from the usual pattern it will be difficult to estimate just how much of the abnormality was due to the solar eclipse and how much was due to the known magnetic storm.

The National Bureau of Standards observations, just reported (*Physical Review*, Aug. 1), mark a new step in what should become standard practice in future eclipse studies with radio.

While the effect of the sun's eclipse on the reflecting layers has been observed before in the actual eclipse zone, there has previously been no attempt to learn what were the normal world-wide conditions and to use this knowledge as a check against the eclipse readings.

Science News Letter, August 15, 1936

PSYCHOLOGY

Fatigue on the Road Increases Accident Risks

TO THE experienced automobile tourist, rolling along a smooth highway for something like seven hours in a day is a simple matter. If he has stopped for a generous lunch and another time or two to stretch his legs and pick up a snack to eat or drink, he probably does not even feel tired.

Psychologists tell us, however, that this man is not mentally as efficient as he was at the start of his drive in the morning. Eye and hand do not work together with the same accuracy that they did. Vision is not so keen. It takes him longer to think. In short, temporarily he is what insurance men would call a "poor accident risk."

Details of psychological tests given to drivers at the beginning and the end of a day on the road are made public in a report by Drs. A. H. Ryan and Mary Warner, of Chicago, Ill., to the *American Journal of Psychology*.

Driving requires, among other things, fine discriminations through the eyesight and the muscular sense, sustained attention and complex movements, the scientists explain. Tests which would measure exactly these same abilities in the laboratory were chosen as a means of checking up on the efficiency of the drivers taking part in the experiment. Ability to keep the attention on a task was scored by means of a test of mental addition and another which required the calling off of the names of some 1,200 different colors. Other tests included measures of eyesight, steadiness on the feet, reaction of the skin to pressure from a blunt instrument (an index to action of the blood vessels) and coordination of the eye with the hand.

A decidedly lowered efficiency on the part of the driver was revealed by these tests given after the long drive when the results were compared with per-

formance on the same tests in the morning. The driver is slower, and seconds count when you are in command of a vehicle traveling along the highway at a speed of possibly 90 feet in every single second. He also makes errors in simple responses like those he is called upon to make in driving. If a driver makes the mistake of reaching for the gear shift lever instead of the emergency brake and then must reach again, and if, in addition, both movements have been slower than his normal reaching speed, think how far his car might have traveled toward disaster in the meantime.

That the deterioration of coordination and the other abilities used in driving was not just a reflection of the time of day but was truly the result of the long hours of driving was demonstrated by tests made on the same men on days spent in recreation or rest instead of driving.

"The effect of a long automobile drive may render a driver temporarily prone to accidents." This is the conclusion of the investigators.

Science News Letter, August 15, 1936

PHYSICS

"Perfect" White Exists Only As an Unattainable Ideal

"White" Is Always Gray, Sometimes Yellow, and May Be Almost Any Color; Science Is Setting Standards

PERFECT white, scientists declared, exists only as an unattainable scientific standard. All substances filling the layman's conception of whiteness are actually darker, grayer than the perfect white.

The nearest colors to the perfect white are those of the purest chalk or a very thick layer of new-fallen snow. But even these fall short of science's rigid standard.

This ordinary conception of whiteness has received scientific recognition only within the past three years. Previously scientists recognized only the perfect white. The increasingly wide use of the word white in connection with commercial articles, however, especially in advertising, made scientific recognition imperative.

Research to determine a method of grading these varying shades of white was undertaken in the Massachusetts Institute of Technology color laboratory. The results, which constitute the basis of all modern discussions of whiteness, were explained to the color conference meeting at the Institute by Dr. David L. Mac Adam, of M.I.T., who conducted much of the research.

All substances which are ordinarily called white, he told the conference, differ from the perfect white in one of two ways. All are darker, grayer than the perfect white. Some may show no other difference, and these are scientifically regarded as grays of differing degrees of brightness. They are commonly called whites, however, the brighter substances being regarded as whiter than the others. Using instruments, he explained, it was possible to measure relative grayness and identify this scale with the scale of whiteness as understood commercially.

Most substances, however, he continued, are not only grayer than the perfect white but are also actually colored to a slight degree. Most frequently this color is yellow, although it can be practically any color. Often, he pointed out, an attempt is made to reduce this coloration by addition of another counteracting coloring, a process known as whitening. To eliminate yellow, for example, a blue dye is added. Occasionally too much of this bluing is used, which accounts for the fact that blue, next to yellow, is the most frequent coloring of supposedly white materials.

Most difficult part of discovering the scientific meaning of whiteness, Dr. Mac Adam reported, was determining just how these discolorations influenced the popular estimate of whiteness as compared with the measured grayness.

It was solved by scientifically measuring the grayness and coloration of a large group of samples and then having individuals arrange them in the order of their apparent whiteness. The graders agreed fairly well and an average order was taken and compared with the measured discoloration and grayness of the samples. From this a method was evolved by which the whiteness of any sample can be predicted simply by measuring this grayness and amount of discoloration.

The discovery, Dr. Mac Adam said, makes possible the accurate and truthful commercial use of the terms white and whiteness and should eliminate ambiguous and misleading advertising claims, possible heretofore because whiteness had not been scientifically studied.

Science News Letter, August 15, 1936

● RADIO

August 18, 2:15 p.m., E.S.T.

MEASURING TIME—Paul Sollenberger of the United States Naval Observatory.

August 25, 2:15 p.m., E.S.T.

CHILDREN WITH NERVES—Dr. Knight Dunlap of the University of California.

In the Science Service series of radio programs over the Columbia Broadcasting System.

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PSYCHIATRY

Psychoanalysis Costs $5,000 To $6,000 Per Case Treated

YOU need to have money, maturity and intelligence before you put yourself into the hands of a psychoanalyst.

So states Dr. Harold Thomas Hyman, New York City physician, who for fifteen years has been collecting experiences in this method of treating human ills.

Dr. Hyman, who needless to say is not a psychoanalyst, reports on forty-three cases treated by psychoanalysis (*Journal American Medical Association,* Aug. 1).

From Dr. Hyman we learn that the total fee for psychoanalysis averages between $5,000 and $6,000 a case. The average visit costs the patient something less than $10, and there are likely to be from 250 to 270 sessions a year. It takes from eighteen months to two years to terminate an analysis.

Although those who practice the Freudian method claim that age is not a factor in treatment, Dr. Hyman holds that before the middle twenties only the unusual person can obtain any insight into the procedure. Beyond the age of 40 or 45 there seems little possibility of altering individuals, he declares.

The successful patient must have a plastic and trained intelligence, Dr. Hyman asserts. As a rule such patients are recruited from the professions and the arts. The average man or woman is wholly unable to grasp or to utilize this form of therapy, in his opinion. Those with profound psychiatric disorders have neither the receptive attitude nor the moral fiber to profit from the information that is disclosed.

Among the forty-three cases Dr. Hyman discusses, fifteen suffered from profound psychiatric disease. The treatment of twelve of these by psychoanalysis resulted in "dismal failures." In two patients the results are still questionable, and one—a homosexual—made a brilliant recovery.

Twenty-eight patients suffered from less serious disorders—hysteria, anxiety states, obsessions and the like. Seventeen of these were distinctly benefited, and eleven experienced no significant aid, according to this critic.

The New York physician hopes that his report will stir up debate and controversy to the point where doctors will establish indications and contraindications for this method of treatment, a method which "offers great promise of fulfillment in the not too distant future."

Science News Letter, August 15, 1936

PLANT PHYSIOLOGY

NATURE RAMBLINGS by Frank Thone

"Chnops," Plus

SIX chemical elements are essential parts of protoplasm, the living substance itself. These are carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulphur. Their initial letters, which happen also to be their chemical symbols, have been arranged into a memory-saver word or mnemonic: CHNOPS—pronounced like the German word for strong liquor, Schnapps. There is a considerable quantity of the first four elements in protoplasm, and only a very little of the other two; but those small amounts are indispensable to life. Take them away, and protoplasm is no longer protoplasm; neither is it any longer alive.

In addition plants require several other mineral elements. Three of these

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have been known to plant physiologists for a long time: potassium, magnesium, and iron. Potassium seems to be necessary for healthy growth of the plant's vegetative parts — leaves, stems, and roots. Plants grown on a short ration of potash may produce seeds and fruits, but they are apt to be undersized. Magnesium and iron are necessary for the proper functioning of chlorophyll, the green stuff that captures sunlight and uses its energy to form food out of water and carbon dioxide. Magnesium is a small but essential part of chlorophyll; iron, though not an actual part, seems to be necessary to keep it working right.

These ten elements have been the classics of plant physiology for many years. It used to be thought that they were the only ones necessary for healthy plant growth, and many textbooks still teach that doctrine.

However, recent research has added at least four more elements to the list. Dr. D. R. Hoagland, professor of plant nutrition at the University of California, recently told a Pacific Coast science meeting that plants must have exceedingly minute amounts of boron, manganese, copper and zinc to remain in good health.

Science has been so long finding out the necessity of these four elements to plants because so little of any of them is needed. In practically all soil waters, and in most of even the carefully purified distilled water used in laboratory experiments, traces of them are present as impurities. But when extra precautions are taken to keep them out, the plants dwindle. Add the least bit of the necessary four, and the plants come back from the very threshold of death and resume normal growth.

Science News Letter, August 15, 1936

ASTRONOMY

200-Inch Telescope Will Have Private Radiophone "Ear"

Directional Radio System Will Enable Scientists At Mt. Palomar To Talk Directly With Those At Caltech

WITH 50 workmen prepared to pour the concrete for the foundation of the world's largest 200-inch telescope on Mt. Palomar, 6,126 foot high mountain in California, an ultra short wave experimental radio station has been installed to facilitate instant communication on construction progress with scientists in charge at the California Institute of Technology in Pasadena, 100 miles away.

Operating on a wave length of seven meters, the radio station, having call letters of W6XKY, is in direct communication with station W6XKX on the roof of the Astrophysical Building at Pasadena.

Because of the directional effect of such short waves, the antennae of both stations are focused on each other. The stations are serving the double purpose of furnishing heads of the Observatory project with direct communication facilities and of permitting Caltech and Bell Telephone scientists to experiment with such short waves.

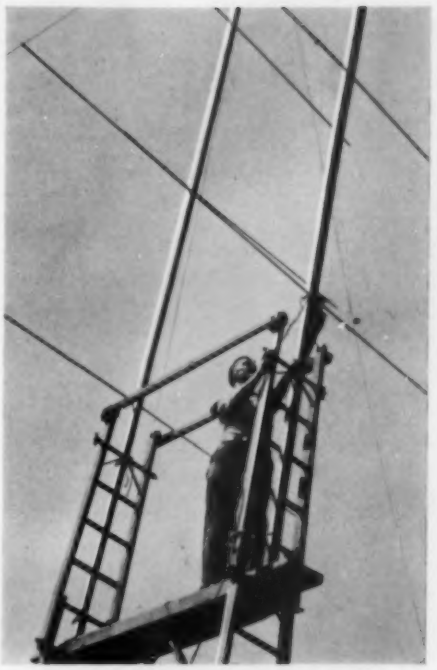
Wave lengths under 10 meters have been considered of little commercial value, and these stations, in addition to furnishing communications, also are supplying scientists with data on the behavior and nature of ultra short waves, information heretofore unavailable. Operating on 7 meters, the stations are unable to tune into any others.

As a result of this radio installation, Capt. C. S. McDowell, supervising engineer for the telescope, stationed in Pasadena, can get into instant touch with supervisors on the mountain regarding construction details.

In addition to construction of the 200-inch telescope foundation, workers are completing the machine shop and power equipment structure in which two generators driven by Diesel engines, will be installed to furnish power to the village at the site.

Experts are installing the Schmidt telescope in a dome completed some time ago. Observations with this 18-inch reflector, an auxiliary "eye" to the 200-inch mirror, will furnish astronomers with an index on seeing qualities by the time the giant telescope is completed and ready for use.

A 1,000,000 gallon water reservoir has been built, as have two Diesel oil storage tanks, in addition to bungalows to house workmen and scientists.



EARS TO SERVE EYE

The new observatory atop Mt. Palomar, California, where the great 200-inch telescope will be erected, and the California Institute of Technology at Pasadena are now connected by a shortwave directed radio telephone system just completed. The directional towers of the transmitter are shown here. Scientists may converse over the 100 miles separation merely by picking up a special telephone on their desks. Ultimately Mt. Wilson Observatory will join the radio circuit.

The contract for fabrication of the 200-inch telescope tube has been awarded Westinghouse in Philadelphia. This part of the telescope, including a giant yoke, will have a total weight of approximately 900,000 pounds.

Delivery of the tube won't start until the dome is completed. The dome itself won't be started until after a surfaced high gear road is laid down to the site, probably next spring.

No other major construction is planned for the remainder of 1936. A skeleton crew will be maintained during the winter, laying water mains, installing transmission cables, and doing additional work on the 200-inch instrument foundation which will be separate from the foundation for the dome to reduce vibration and shock on the instrument.

Science News Letter, August 15, 1936

Tombstones trace ancestry to the "false doors" of ancient Egyptian tombs, through which the spirit of the deceased might return to use articles in his tomb.

PERIODICAL ROOM

•First Glances at New Books

Nature

A NATURE SKETCHBOOK—William Ray Allen—*University of Kentucky,* 209 p., 75c. single copy, three copies, 50c each, ten or more copies to the same address, 40c. A series of radio talks made into an informal book, with camera illustrations by the author. It combines real field knowledge of biology, esthetic and philosophic appreciation of the phenomena observed, and salty touches of plain horse-sense: "*Q:* Is it bad luck to kill a spider? *A:* It is to the spider."

Science News Letter, August 15, 1936

Archaeology

THE MESOLITHIC SETTLEMENT OF NORTHERN EUROPE—J. G. D. Clark—*Cambridge, Macmillan,* 284 p., 74 figs., 8 pl., $9. The Mesolithic, as defined in this volume, is the culture that flourished in point of time between civilizations of the Old Stone Age and the New. Dr. Clark describes this 6,000-year period fully, taking into account the profound changes in geography and in animal and plant life that unfolded while man in Northern Europe developed three groups of cultures. Of special interest are the discussions of pollen analysis and clay varves as means of dating remains of this period.

Science News Letter, August 15, 1936

Astrophysics

THEORETICAL ASTROPHYSICS — S. Rosseland—*Oxford University Press,* 355 p., $8. In this volume a bird's eye-view of our knowledge of stellar atmospheres and envelopes is projected upon atomic physics as a background. Its twenty-three chapters present a full mathematical and physical picture of the constitutions of stellar atmospheres, gaseous nebulae, and inter-stellar clouds, as well as principles and theories of astrophysics. But the introduction is an easily readable summation of what the study of light told us about the composition of the universe.

Science News Letter, August 15, 1936

Ethnology

THE RE-ESTABLISHMENT OF THE INDIANS IN THEIR PUEBLO LIFE THROUGH THE REVIVAL OF THEIR TRADITIONAL CRAFTS—Henrietta K. Burton—*Teachers College, Columbia University,* 96 p., $1.60. This experiment at one pueblo, San Ildefonso, indicates that simple methods of reviving ancestral craftwork can bring greater economic security to an Indian group. The pueblo also improved in its morale and general community life. While not all tribes have such an art heritage as these gifted pottery makers, the author points out that each tribe has some occupation which can be utilized for its re-establishment.

Science News Letter, August 15, 1936

History

HISTORY OF EARLY IRAN—George G. Cameron—*Univ. of Chicago Press,* 260 p., $3. With the unearthing of Near Eastern cities, there is growing interest in the early history of the region. This book fills in one of the gaps on the ancient history shelf, by going far back of Cyrus the Persian and building up events on the Iranian plateau from prehistoric times. Much of the land's history, however, still lies buried in mounds, awaiting discovery, the author reminds us.

Science News Letter, August 15, 1936

Exploration

THE PILOTS' BOOK OF EVEREST—The Marquess of Douglas and Clydesdale and D. F. M'Intyre—*Doubleday, Doran,* 270 p., $2.75. The eventful story of the first two successful flights over the world's highest mountain, told this time by the men who piloted the planes and came safely through, as another Britisher puts it, "by discipline and nerve and trained judgment."

Science News Letter, August 15, 1936

Anthropology

ESSAYS IN ANTHROPOLOGY IN HONOR OF ALFRED LOUIS KROEBER—*Univ. of California Press,* 433 p., $6.50. In honor of Prof. Kroeber's sixtieth birthday, 36 anthropologists in this country and abroad have contributed papers for this elaborate and interesting volume. The subjects appropriately range over the various fields of anthropology that have claimed the attention of Prof. Kroeber himself. The volume opens suitably with chapters of personal reminiscence and professional appreciation by two confrères of this distinguished man of science.

Science News Letter, August 15, 1936

Reference Books

THE CONCISE OXFORD DICTIONARY OF ENGLISH PLACE-NAMES — Eilert Ekwall—*Oxford Univ. Press,* 520 p., $5. This volume covers the map of England very thoroughly, giving the pronunciation, origin, and perhaps a bit of history for each town, hamlet, river, or lake. Special attention is given to the etymology of the names.

Science News Letter, August 15, 1936

Geology—Paleontology

BIG BONE LICK—Willard Rouse Jillson—*The Standard Printing Co.,* 164 p., $2. Dr. Jillson, former state geologist of Kentucky, calls Big Bone Lick "the most extraordinary depository of bones of the great hoofed animals of the Glacial Age in America." Fame of this graveyard of the mammoth made it for years a collector's paradise, and now the devastated scene is a tragic reminder of what persistent bone hunting can do to wreck a site that "deserved, and still deserves, a better fate." Dr. Jillson tells the story vividly.

Science News Letter, August 15, 1936

Archaeology

TWO PUEBLO RUINS IN WEST CENTRAL ARIZONA—Edward H. Spicer and Louis P. Caywood—*Univ. of Arizona,* 115 p., 57 illus., 50c. Reports excavation of King's Ruin and Fitzmaurice Ruin, both tentatively dated in the eleventh and twelfth centuries A.D. The King's Ruin pueblo was preceded by an earlier settlement of pit dwellings.

Science News Letter, August 15, 1936

Archaeology

EXCAVATIONS AT THERMI IN LESBOS —Winifred Lamb—*Cambridge (Macmillan),* 226 p., 50 pl., $18.50. A comprehensive report of excavations at an island town that was once an important contemporary of famous Troy. Relationships with Troy and Mycenae are discussed. The site was chosen because it offered the chance to explore five successive towns, represented by stratified remains, thus providing much material for studying the succession of cultures and relationships in this region.

Science News Letter, August 15, 1936

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